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FACTORS FOR EXTENDING IN-PROGRESS LACTATION RECORDS TO A 305-DAY EQUIVALENT

Jeffrey F. Keown

University of Nebraska-Lincoln, jkeown1@unl.edu

L. Dale Van Vleck

University of Nebraska-Lincoln, dvan-vleck1@unl.edu

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Keown, J. F. and L. D. Van Vleck. 1972. Factors for extending in-progress lactation records to a 305-day equivalent. *Journal of Animal Science* 35:176-177.

Abstract: Paper for Presentation at the 64th Annual Meeting of the American Society of Animal Science. The data consisted of 204,558 complete Holstein lactations in 2,100 herds compiled by the New York Dairy Records Processing Laboratory from 1959 to 1969. All lactation records had to have a 9th or 10th test day present to be regarded as complete. The generalized least squares analysis used a model including effects due to the mean, herd-year and season-age-stage of freshening which were assumed to be fixed. The error term included the random effects due to the cow and residual. Generalized least squares estimates for specified stages of lactation for milk and fat were found for lactations 1, 2, 3 and ≥ 4 which were grouped by age of freshening, two age groups for the first three lactations and one for \geq four lactations. Extension factors will be presented which differ from current U.S.D.A. factors. The new factors emphasize the need for considering lactation number, season and age at freshening when extending in-progress lactation records. The extension factors differ for each lactation. The major differences occur between the first two and later lactations. The importance of considering season of freshening is apparent for the early stages of the lactation. The age effect is significant for the factors for early stages of lactation but decreases as lactation length increases. Differences due to age become less important as lactation number increases. The factors for third and later lactations are only slightly affected by age of the cow

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Jersey calves. Sex differences, expressed as a ratio of steer to heifer means, were much larger for the Red Sindhi-sired calves than the Brahman-sired calves. Differences between sexes for Brahman-sired calves were 108.5, 122.5 and 122.8% for yearling, long-yearling and 2-year-old weights, respectively. Among the Red Sindhi-sired calves sex ratios were 116.5, 133.7 and 142.2% for yearling, long-yearling and 2-year-old weights, respectively.

43. **SELECTION OF DAMS FOR PLANNED MATINGS.** W. R. Inbau and T. M. Sutherland*, *Colorado State University, Fort Collins.*

To evaluate the various methods of selecting cows to be dams of future progeny test bulls through a planned mating scheme, weaning weight, yearling weight and carcass data on 529 cows taken over 34 years at the U. S. range Livestock Experiment Station at Miles City, Montana were studied. The selection methods compared were selection on the cow's own phenotype, selection by index and selection based on the cow's progeny performance. The first part consisted of calculating 69 theoretical selection indexes at five levels of heritability from a phenotypic correlation matrix using the phenotypic relationships between the cow, her parents, her half-sibs and her progeny. The relative accuracy of the different indexes, as reflected by the magnitude of the corresponding multiple correlation coefficients, are discussed. The partial regression coefficients obtained in the theoretical investigation were used to compute the indexes on the cows with data from Miles City. Breeding values based on the cow's own performance, an index using all available information, an index using all information except progeny and a breeding value based on the cow's progeny performance were compared. The results of the various analyses indicated that selection of cows to produce sons with superior weaning weight and yearling weight genotypes should be based on an index using all available information on the cow and her relatives. Even when the index contains no progeny data, selection by index is more accurate than selection based on the cow's phenotype or her progeny information alone.

44. **PRODUCTIVITY OF GILTS BRED FOR PUREBRED AND CROSSBRED PIGS.** R. K. Johnson* and I. T. Omtvedt, *Oklahoma State University and U.S. Department of Agriculture, Stillwater.*

A total of 104 Duroc (D) gilts, 107 Hampshire (H) gilts and 88 Yorkshire (Y) gilts from the swine breeding project herds were mated in all combinations to compare the performance of purebred gilts when bred to produce purebred and crossbred pigs. Six boars of each breed were each mated to three gilts of the same breed and to three gilts from each of the other two breeds in each of two seasons. One gilt from each mating type for each boar (total of 119) was slaughtered 30 days postbreeding to evaluate ovulation rate and early embryo development. The remaining 180 gilts were farrowed. Breed of sire effect was small while breed of dam effect was large for all traits. Y and D gilts each averaged 13.8 corpora lutea (CL) compared to 12.1 CL/gilt for H gilts ($P < .05$). D, H and Y gilts averaged

10.8, 9.2 and 11.5 normal embryos/gilt, respectively. Gilts with crossbred embryos averaged 10.8 normal embryos and a 82.7% 30-day survival rate compared to 10.2 embryos and a 77.6% survival rate for gilts with purebred embryos. Embryo length for D, H and Y gilts averaged 25.0, 25.9 and 24.3 mm., respectively, but differences between purebreds and crossbreds were nonsignificant. Gilts with crossbred litters farrowed 0.5 more pigs, 9.6 vs. 9.1 ($P < .25$), and had heavier litter birth weights, 10.7 vs. 9.8 kg ($P < .05$). D, H and Y gilts averaged 9.7, 8.9 and 9.5 pigs/litter with litter weights of 11.3, 10.1 and 9.4 kg, respectively. D gilts with crossbred litters averaged 1.3 more pigs/litter ($P < .05$) than D gilts with purebred litters. The advantage for H and Y gilts with crossbred litters was only 0.2 pigs/litter. Pig birth weight was not influenced by mating structure.

45. **CARCASS MERIT OF PUREBRED AND 2-BREED CROSS BARROWS.** R. K. Johnson*, I. T. Omtvedt and L. E. Walters, *Oklahoma State University and U.S. Department of Agriculture, Stillwater.*

A total of 190 purebred and two-breed cross carcasses were evaluated over a two-season period in the Oklahoma swine breeding project. Data included a random sample of 20 to 23 barrows slaughtered from each breed group on a weekly basis as they reached 99.8 kilograms. Breeding groups were: Duroc (D), Hampshire (H), Yorkshire (Y), DXH, HXD, DXY, YXD, HXY and YXH. In addition to the standard carcass measurements and cut-out data, each loin was scored from 1 to 7 for marbling (1=devoid, 7=abundant) and firmness (1=very soft, 7=very firm). Crossbreds averaged 0.41 cm longer carcasses and had 0.38 higher marbling scores than purebreds ($P < .05$). Significant heterosis was obtained in H-Y crosses for backfat (+.15 cm), marbling score (−.62 units) and firmness score (−.57 units); in D-H crosses for marbling and firmness score (1.19 and +.79 units, respectively); and in D-Y crosses for marbling score (+.59 units). Differences between purebreds were significant for length (D were 1.40 and 1.78 cm shorter than H and Y, respectively), backfat (H averaged 0.48 cm less than D and Y, respectively); loin eye area (33.5 sq cm for H vs. 31.2 and 30.3 for D and Y, respectively), and lean cut percentage of live weight (42.0 for H vs. 39.7 and 40.0 for D and Y, respectively). Quality scores for D carcasses were higher than those for H and Y. Although the numbers are somewhat limited, these data indicated that DXY carcasses were superior ($P < .05$) to the reciprocal YXD carcasses for backfat thickness, loin area, marbling score and yield of lean cuts. Similar superiority was noted for HXY carcasses over the reciprocal YXH carcasses.

46. **FACTORS FOR EXTENDING IN-PROGRESS LACTATION RECORDS TO A 305-DAY EQUIVALENT.** J. F. Keown* and L. D. Van Vleck, *Cornell University, Ithaca.*

The data consisted of 204,558 complete Holstein lactations in 2,100 herds compiled by the New York Dairy Records Processing Laboratory from 1959 to 1969. All lactation records had to have a 9th or

10th test day present to be regarded as complete. The generalized least squares analysis used a model including effects due to the mean, herd-year and season-age-stage of freshening which were assumed to be fixed. The error term included the random effects due to the cow and residual. Generalized least squares estimates for specified stages of lactation for milk and fat were found for lactations 1, 2, 3 and ≥ 4 which were grouped by age of freshening, two age groups for the first three lactations and one for ≥ 4 lactations. Extension factors will be presented which differ from current U.S.D.A. factors. The new factors emphasize the need for considering lactation number, season and age at freshening when extending in-progress lactation records. The extension factors differ for each lactation. The major differences occur between the first two and later lactations. The importance of considering season of freshening is apparent for the early stages of the lactation. The age effect is significant for the factors for early stages of lactation but decreases as lactation length increases. Differences due to age become less important as lactation number increases. The factors for third and later lactations are only slightly affected by age of the cow.

47. MILK POLYMORPHISMS AND GROWTH OF BEEF CALVES. C. A. Kiddy*, K. P. Board and L. R. Miller, *Anim. Sci. Res. Div., Beltsville, Md., VPI, Front Royal, Va. and Data Syst. Appl. Div., Beltsville, Md.*

Milk samples from 150 Angus and 120 Shorthorn beef cows from the Beef Cattle Research Station, Front Royal, Va. were typed for milk proteins α_{s1} -casein, β -casein, κ -casein and β -lactoglobulin in 1970 and 1971. Gene frequencies were: Angus- β -Lg[A=.14, B=.86], α_{s1} -Cn[B=.92, C=.08], β -Cn[A¹=.05, A²=.95], κ -Cn[A=.85, B=.15] and Shorthorn- β -Lg[A=.3, B=.7], α_{s1} -Cn[B=.10], β -Cn[A¹=.53, A²=.47], κ -Cn[A=.79, B=.21]. Calves of the typed cows were weighed at birth and monthly until weaned. Four inbred lines and one growth selection line were studied in each breed. Average daily gain (ADG) to midsummer and ADG to weaning values for each calf were adjusted for age of dam and analysed by least squares. The model contained year, breed, line, milk protein type, sire and sex of calf as main effects and two-factor interactions. Six analyses were made involving three milk protein loci (β -Lg, β -Cn, κ -Cn) and the two growth periods. Lines within breed and breeds were significant sources of variation in all analyses. Least squares means for breeds were: Angus, .78 kg/day from birth to midsummer and .80 from birth to weaning, and Shorthorn, .73 for both periods. Milk type was not significant in any analysis but differences in ADG to weaning among κ -Cn types approached significance ($P \approx .10$). Least squares means for the κ -Cn types (ADG to weaning) were: AA=.77 (237 calves), AB=.79 (94 calves) and BB=.73 (11 calves).

48. GENETICS OF THE DOUBLE MUSCLE SYNDROME IN CATTLE. Nat M. Kieffer*, T. C. Cartwright and J. E. Sheek, *Texas A&M University, College Station.*

Two separate herds of cattle were utilized in the study. Herd A consisted of 14 double muscled cows

representing 4 breeds. All cows in herd A were bred to double muscled bulls and each cow produced at least one calf during the 4 years of the study. Herd B was composed of 66 non-double muscled daughters of a bull which had previously sired double muscled calves but was not himself double muscled. Fifty-one of these cows were mated to a bull suspected to be heterozygous for double muscling on the basis of phenotype but was not himself double muscled. The remaining 15 cows were bred to their sire. Only one calf crop was produced by Herd B. Twenty-four calves were produced in Herd A. Although some variation occurred in the degree of perinatal muscling in the calves from Herd A, by the time they were 60 days of age all of them were unmistakably double muscled. Nine of the 66 calves produced in Herd B were double muscled. The number of double muscled calves produced in each herd corresponded closely to the number expected on the assumption that double muscling is due to a single gene. However, the double muscle gene is neither a simple Mendelian dominant nor recessive since it expresses itself to a degree in the presence of its normal allele. Whether or not it is termed a partial dominant or an incomplete recessive depends upon one's interpretation of theories of gene action.

49. EFFECT OF COW SIZE AND BREED ON NET EFFICIENCY. E. W. Klosterman*, C. F. Parker, R. R. Bishop, V. R. Cahill and F. S. Ruland, *Ohio Agricultural Research and Development Center, Wooster.*

Hereford (H), Hereford X Angus (HA), Hereford X Charolais (HC), and Charolais (C) cows bred to H or C bulls were individually fed for 365 days and their calves to an estimated slaughter grade of low choice. Over a 2-year period, data were obtained from 61 cow-calf pairs. Least squares means adjusted for differences among breed and age of cows and sex of calf were used to compare three weight classes of cows which averaged 389, 465 and 548 kilograms. Larger cows had greater weight/height ratios and weaned significantly heavier calves, they required more total feed and their calves ate more prior to weaning. The differences among weight classes in TDN per unit of weaning weight were small. Differences in post-weaning performance were not significant among weight classes but calves from the largest cows produced carcasses which were significantly heavier. HA cows produced the most milk, weaned the heaviest calves and required the least TDN per unit of weaning weight, however, their calves were the least efficient on feed post-weaning. Calves from H cows were the lightest at weaning but gained the most post-weaning. Differences in carcass traits among calves out of the cow breeds were not significant except those from C cows graded one-third grade lower. Net efficiency, TDN/wt edible portion, tended to favor the HC and HA cows. There was a pooled correlation coefficient of -.36 between weaning weight and absolute gain and -.72 between weaning weight and relative gain post-weaning. Relative gain and TDN consumption were significantly correlated, .56, but the correlation between relative gain and percent edible portion was essentially zero.